SOLUTION OF PROB. 313 (SEE P. 164) BY PROF. D. V. WOOD. — There being no escape of heat due to compression, the law of pressure would be expressed by

$$pv^k = \text{constant} = p'v'^k, \qquad (1)$$

where p' = initial pressure of the atmosphere = 15lbs, nearly, v' = vol. of the cylinder = al, if a is the area of the base, p = the pressure within the cylinder when the weight has descended a distance x, $a(l-x)$ = the volume when the pressure is p, $k = 1.408$; then, from (1),

$$p = \frac{p'l^k}{(l-x)^k}, \quad \text{and} \quad \frac{wd^2x}{gdt^2} = w + p'a - \frac{ap'l^k}{(l-x)^k}.$$

Integrating, observing that for $x = 0$, $v = 0$,

$$v^2 = \left(1+\frac{p'a}{w}\right)2gx+\frac{2ap'g}{w(k-1)}\left(\frac{l[l-x]^{k-1}-l^k}{[l-x]^{k-1}}\right).$$

At the end of the downward movement $v = 0$; therefore

$$x(w+pa)(l-x)^{k-1}+\frac{ap'l}{k-1}(l-x)^{k-1} = \frac{ap'l^{k+1}}{k-1},$$

from which x may be found by trial after numerical values have been substituted for the known quantities.

SOLUTIONS OF PROBLEMS IN NUMBER FIVE.

SOLUTIONS of problems in No. 5, have been received as follows:

From Prof. W. P. Casey, 320, 321, 323; Prof. J. H. Kershner, 324 and Miscellaneous prob. No. 1 (see p. 149); Octavian L. Mathiot, 320; Prof. D. J. Mc Adam, 323; Prof. E. B. Seitz, 324; Prof. M. C. Woodward, 322; Prof. D. V. Wood, 322; H. Heaton, 322.

320. "The transverse and conjugate axes of an ellipse being given, to find the diameter of the circular base, and the altitude, of the right cone, and where to pass a plane so as to produce the given ellipse."

SOLUTION BY OCTAVIAN L. MATHIOT, BALTIMORE, MD.

Construction. — Draw $AB = 2a$, the given transverse diameter. At P, the centre of AB, erect a perpendicular, and with A as a centre and radius AB, describe a vertical arc in which suppose a poiut D to be taken such that if BD be produced to meet the perpendicular from P in C, and the triangle PBC be revolved abont PC as an axis, a cone will be describd a section of which, having AD for transverse axis, will have the given conjugate axis.